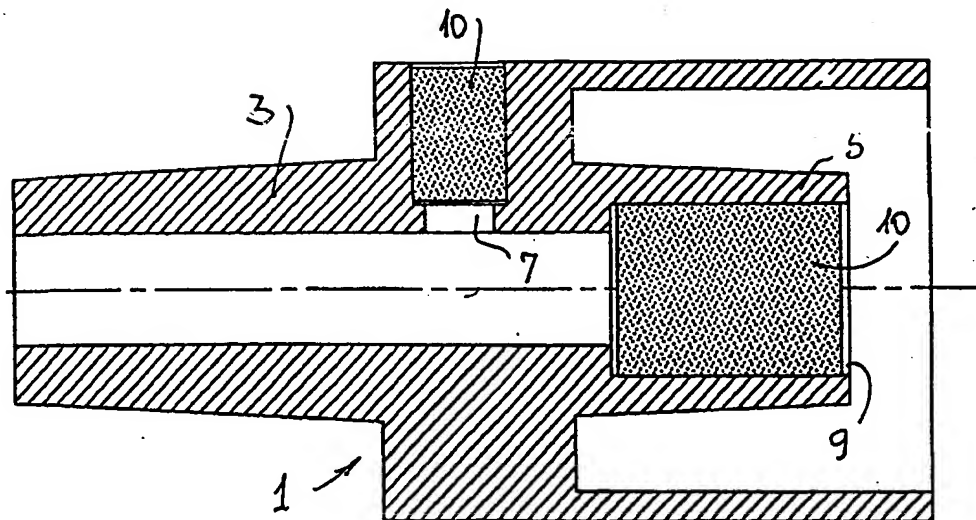




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: STERILE ADAPTER



(57) Abstract

A sterile adapter to be used with syringes or intra-vascular needles is provided. The adapter includes a body (1) and a vent (10). The body (1) has a male end (3) to enable the mounting of the adapter to a needle or the like, and for mounting the adapter to a male/female end (5). The vent (10) establishes communication between the inner side of the adapter and the atmosphere and is adapted to release trapped air.

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STERILE ADAPTER

FIELD OF THE INVENTION

The present invention relates to a sterile adapter to be used with
5 syringes or intra-vascular needles.

BACKGROUND OF THE INVENTION

A device for identification of penetration by an intra-vascular needle
into a blood-conducting vein or artery is based on recognition of the pressure
10 within the blood vessel. It is expected that when the needle punctures the second
wall of the blood vessel, part of the blood which entered the needle will be
absorbed by the tissue, and consequently the decrease of the pressure will be
recognized. However, in some cases the decrease of the pressure is not fast
enough.

15 The pressure within a blood vessel can be measured by means of
any kind of blood pressure indicator which is attached to the proximal end of the
needle. However, there are a number of problems with this:

When an intra-vascular needle has entered a blood-conducting vein or
artery, the blood does not enter the syringe to its full length but only to its free
20 distal end. This occurs because the air which is locked within the needle has no
vent to escape and is compressed within the needle.

In cases of very thin needles, after the needle has been removed from the blood vessel a phenomenon of the capillarity of the needle occurs, namely, the pressure within the needle remains. (This capillary phenomenon is reduced when the diameter of the needle is larger.) Due to this phenomenon it is not possible to detect double puncture of a blood-conducting vein or artery.

The use of an adapter for the pressure release at the distal end of the needle could solve the problem.

DESCRIPTION OF THE INVENTION

In order to neutralize the phenomenon of capillary pressure when the needle is removed or is not within the blood vessel, it is proposed to add means for releasing the pressure within the needle in a controlled manner.

5 Consequently, when the needle is not within or removed from the blood vessel, the pressure within the needle will be reduced.

The means for releasing the pressure will not allow any liquid to be released from the needle, since it is mounted at the distal end of the needle. The diameter there is relatively large, and consequently the
10 capillary phenomenon will not exist. Liquid which reaches the point where air is released will be sealed.

As long as the distal end of the needle is under pressure, the air locked within the needle is slowly released through the vent. Since the rate of flow of blood into the needle is larger than the rate of release of
15 locked air, the blood pressure will be sensed by the appropriate sensor. When the needle is not within the blood vessel, such as in the case of a double puncture, the flow of the blood into the needle stops, which will be sensed by the appropriate sensor.

Since the rate of release of the air through the vent is quite
20 slow, the needle may be fully penetrated into the blood vessel before the blood reaches the vent and possibly seals it.

The vent could be effected either by hydrophobic material or by means of small slots or bore as will be indicated.

According to the invention the adapter comprises a body having a luer male end to enable the connection to a needle, a male/female end to enable the connection to a sensing device, and a vent which establishes communication between the inner side of the adapter and the atmosphere, adapted to release locked air.

The invention will now be described with reference to the annexed drawings in which:

Figure 1 is a cross-section of the adapter where the vent is an aperture sealed with hydrophobic material.

Figure 2 is a cross-section of the adapter where the vent comprises longitudinal narrow slots.

Figure 3 is a cross-section along line A-A of Figure 2.

Turning first to **Figure 1** the adapter according to the invention comprises a body **1** having a male end part **3** and a male/female end part **5**. In this embodiment an aperture **7** is provided intermediate both ends. The aperture **7** and outlet **9** are stuffed with a porous hydrophobic material **10** which enables the escape of air but prevents the outflow of blood, hence the sterility of the adapter. Instead of aperture **7** a small diameter bore could be provided.

In the embodiment seen in **Figure 2** and **3** the vent is made of longitudinal narrow slots **11** provided on the outer circumference of male end part **3** of the adapter. The narrow slots allow the air to escape in the space between the outer side of the male end part **3** of the adapter and the inner side of the needle.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the invention is defined by the claims which follow:

CLAIMS

1. An adapter to be used with needles or syringes which comprises:
a body having a male end to enable the mounting of the adapter
to a needle or the like, and to a male/female end; and
5 a vent which establishes communication between the inner side of
the adapter and the atmosphere said vent being adapted to release
trapped air.
2. An adapter according to claim 1 wherein said vent is an aperture
10 provided intermediate both ends of the adapter.
3. An adapter according to either of claims 1 and 2 wherein said aperture
and the outlet of the adapter are provided with hydrophobic and porous
material.
- 15 4. An adapter according to claim 1 wherein the circumference of said male
end part is provided a plurality of longitudinal narrow vent slots.

1/3

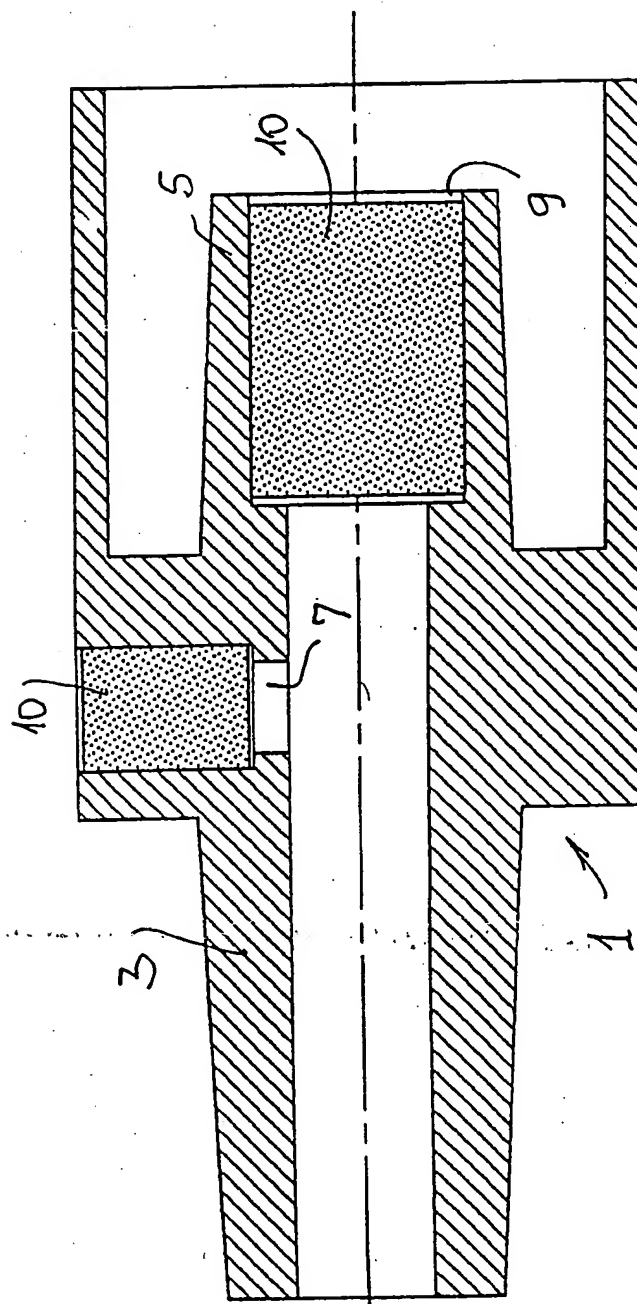


Fig. 1

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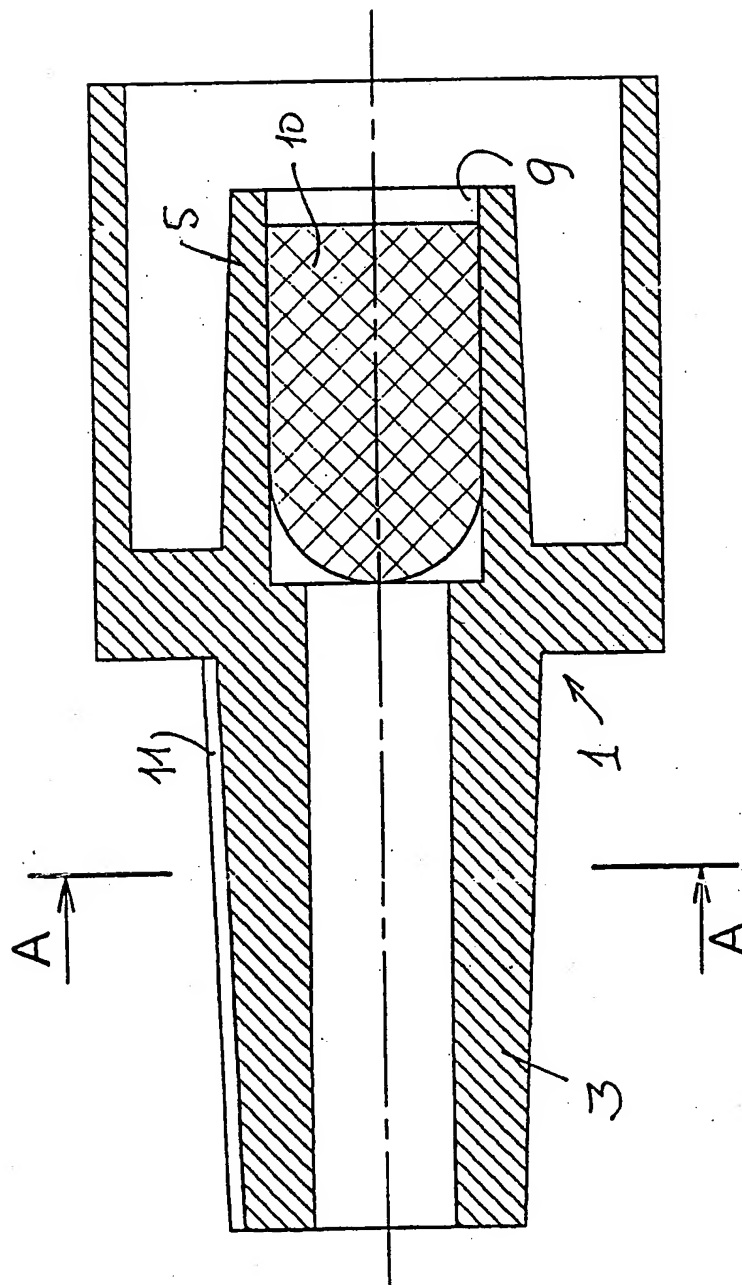


Fig. 2

3/3

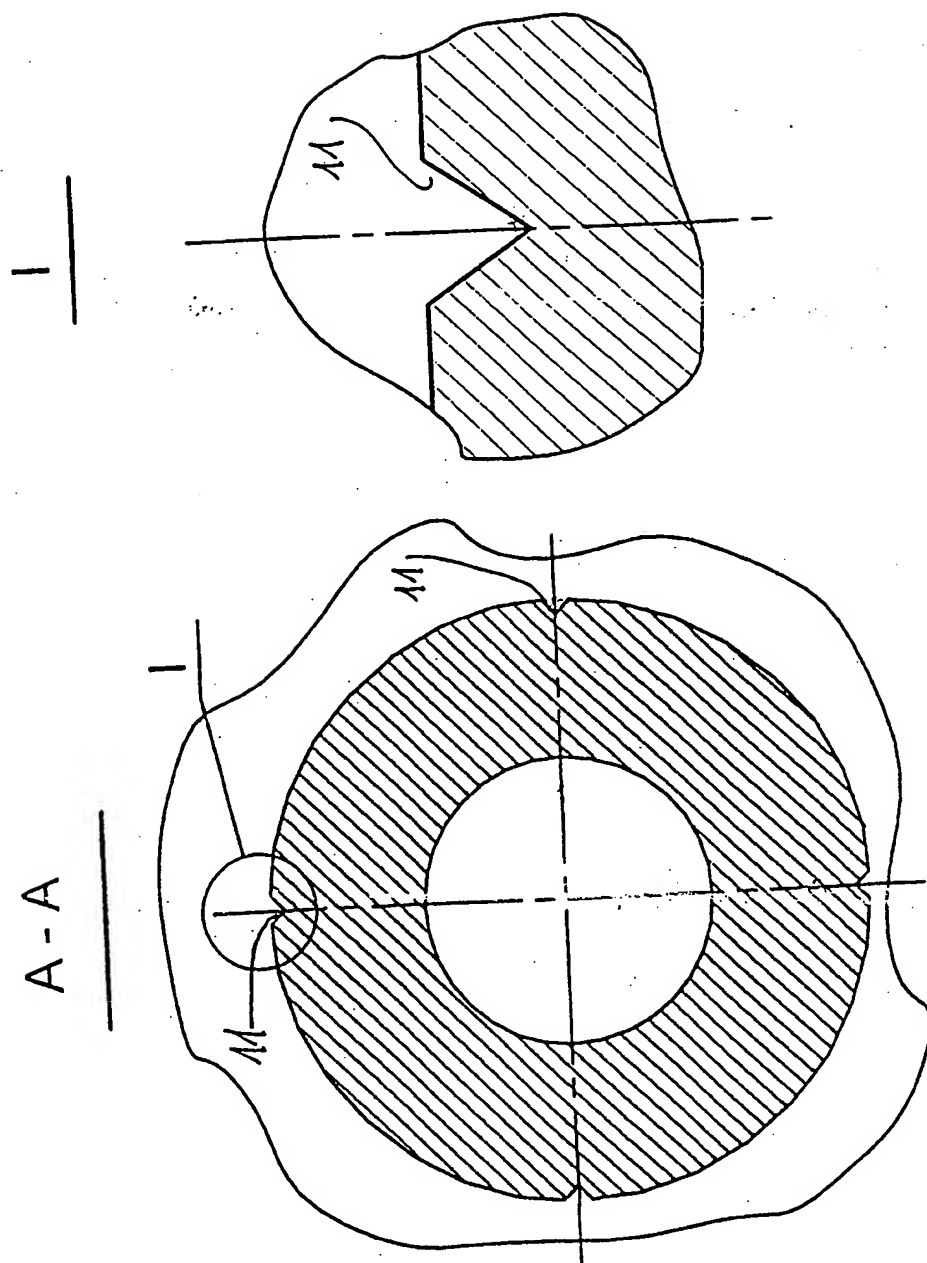


Fig. 3

INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/IL98/00511
A. CLASSIFICATION OF SUBJECT MATTER
 IPC(6) : A61M 1/00, 25/16, 18, 39/00, 10
 US CL : 604/122, 533

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/122, 167-169, 190, 284, 533-539, 905

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,935,010 A (COX et al) 19 June 1990, entire document.	1-3
Y		4
X	US 5,242,411 A (YAMAMOTO et al) 07 September 1993, entire document.	1, 2
X	US 5,674,200 A (RUSCHKE et al) 07 October 1997, entire document.	1, 2
Y	US 5,658,260 A (DESECKI et al) 19 August 1997, Fig. 14, and col. 7 lines 14-20.	4
A	US 4,682,980 A (SUZUKI) 28 January 1987, entire document.	1-4

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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